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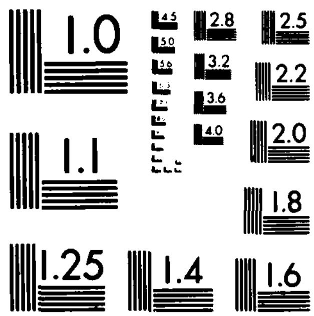

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AD-A126 281

AIR FORCE
PACKAGING EVALUATION
AGENCY

1982

ANNUAL REPORT

HEADQUARTERS

AIR FORCE

ACQUISITION LOGISTICS DIVISION

WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433

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AIR FORCE PACKAGING EVALUATION AGENCY
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AFALD MISSION

The mission of the Air Force Acquisition Logistics Division is to improve USAF force readiness and reduce life cycle costs by challenging requirements and assuring consideration of supportability, reliability, and maintainability during the design, development, and production processes of weapon system acquisition, and to direct acquisition programs which use already developed systems to meet operational needs.

AFPEA MISSION

The Air Force Packaging Evaluation Agency provides the Department of the Air Force with a packaging engineering capability that is available to all major commands and to certain other Federal agencies. To assure dynamic engineering and technical progress in packaging, the AFPEA investigates, designs, develops, tests, and evaluates containers, materials, methods, and techniques. It provides integrated logistics support planning for acquisition programs and assistance to program managers for packaging and transportability requirements.

INTRODUCTION

This report provides actions, status, and future efforts of the agency in accordance with the requirements of AFR 71-2.

During 1982, the agency had 119 new projects, many of which were related to increased emphasis on war readiness and new systems development. While many efforts are long term, extended over 2 to 5 years, the agency was able to complete 82 projects. The progress made on the program for cargo mobility containers was excellent in that design and initial operational tests were completed and production started in May 1982. Initial production of 600 sets is expected to be completed in early 1983.

Another significant effort was the initial implementation of a Computer-Aided Design System for packaging. Work stations at the air logistics centers (ALCs) became operational in the latter part of 1982 and are expected to reach a high rate of productivity in 1983. Implementation of packaging design data will continue over the next six years to reach a total system with all designs available. Use of finite element modeling of future designs will allow analysis and simulated testing to ensure design optimization before manufacturing expense is incurred.

Emphasis is being made to support new systems and equipment during the acquisition phase in order to obtain the most effective packaging possible and to improve supportability for the Air Force inventory. The use of current technology and the application of lessons learned from previous experience is a continuing goal. Initiatives are being made to improve the identification of electrostatic sensitive items for protection and handling, as well as provide updates on latest packaging materials for protection. Efforts have also been made toward a means of unit pricing of data on acquisition contracts for analysis. Initial results have shown that significant savings can be achieved.

Government and industry activities are encouraged to contact the agency with comments or ideas to improve Air Force packaging.

TABLE OF CONTENTS

LESSONS LEARNED

The Air Force Acquisition Logistics Division (AFALD) is tasked to establish and maintain a corporate memory of lessons learned to provide feedback for improving our acquisition programs. A "lesson learned" is simply a recorded experience of value in the conduct of future programs. The purpose is to profit from our experience and to attain improved supportability and reduced support costs. AFPEA has actively participated in recording packaging lessons learned. Application of these lessons is the bottom line. The lessons that follow represent a small portion of those currently stored in the AFALD lessons learned corporate memory file. Access to these and all other lessons can be gained by contacting AFALD/PTL, WPAFB OH 45433, (513) 255-6796/2901, AV 785-6796/2901.

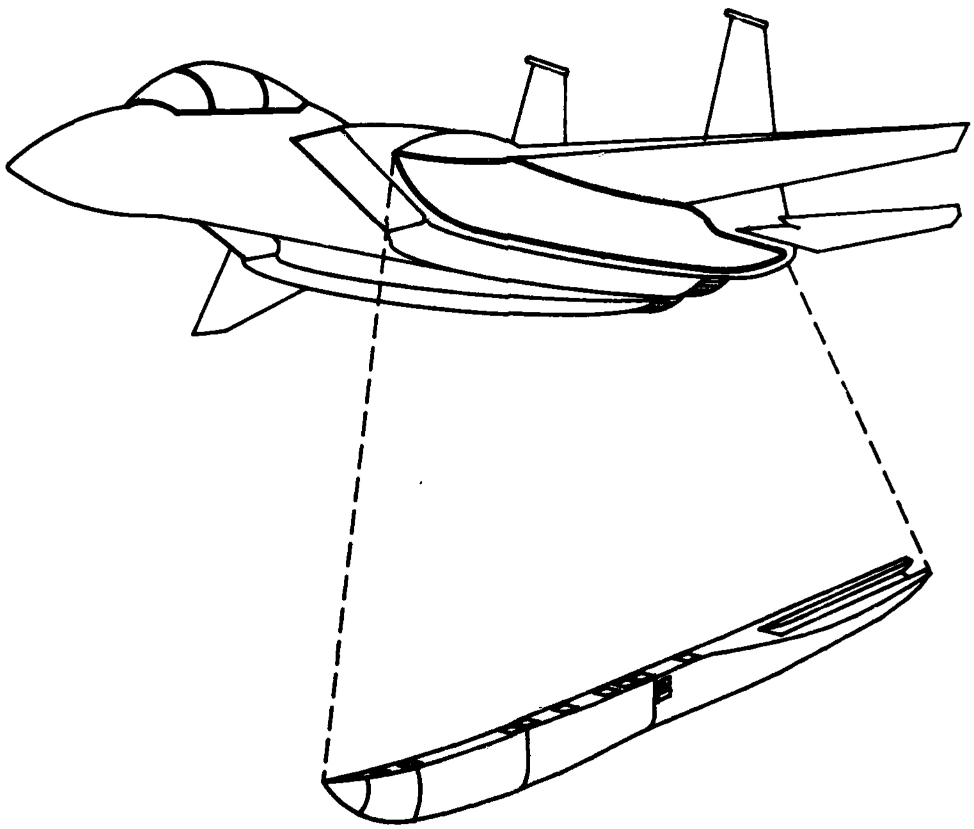
Lessons Learned No.	Title
961	Chemical Performance for Foam-In-Place Packaging
975	Designing Containers for Low Temperature Environments
878	Polyurethane Foam for Packaging Aircraft Guidance Components
849	Shortage of Critical Container Components
848	Packaging of Small Avionics Equipment
979	Pricing of Contractor Prepared Packaging Data
1081	Identification of Hidden Damage Due to Packaging
259	Missile Component Container Water Intrusion
838	Shipping Container Blocking and Bracing
380	Multiple Quantities in Packages

(Mr. Clyde Salzman, AFALD/PTPP, (513) 255-3226, AV 785-3226)

F-15 CONFORMAL FUEL TANK SHIPPING CONTAINER

Engineering assistance is being provided to the F-15 Systems Program Office for design, evaluation and testing of a reusable, wooden shipping container for the F-15 conformal fuel tank. The container is essentially constructed to the requirements of MIL-C-104 with a skid-style base and plywood sheathed top and sides. The first article should be constructed by January 1983 and will be subjected to tests consisting of mechanical handling tests, cornerwise and edgewise rotational drop tests, and pendulum-impact tests.

(Mr. Rickey T. Adams, AFALD/PTPD, (513) 257-3362, AV 787-3362)



EVALUATION OF VIBRATION TEST REQUIREMENTS

Presently many Air Force shipping container procurement documents require that vibration test Method 5020.1 in Federal Test Method Standard 101 be used for qualification of containers. Many otherwise satisfactory containers with elastomeric isolators have failed this vibration test. Some of these containers have been used successfully for years without the occurrence of shock isolation system failures. This indicates that Method 5020.1 is not a realistic simulation of the actual vibration environment encountered in shipment. This is further verified by the fact that recordings of environmental transportation vibration data do not support the test levels specified in Method 5020.1. AFPEA has issued an interim vibration test method, based on the vibration levels used in MIL-STD-648, for Air Force usage and guidance. It is believed that the use of this interim method will significantly reduce the cost of containers due to unnecessary overdesign and overtesting. A detailed, tailorable vibration test method and procedure will be developed and issued, based on further analysis and verification.

(Mr. Walter Maurice, AFALD/PTPT, (513) 257-4519, AV 787-4519)

SIMULATION TECHNIQUE FOR CONTAINER EVALUATION

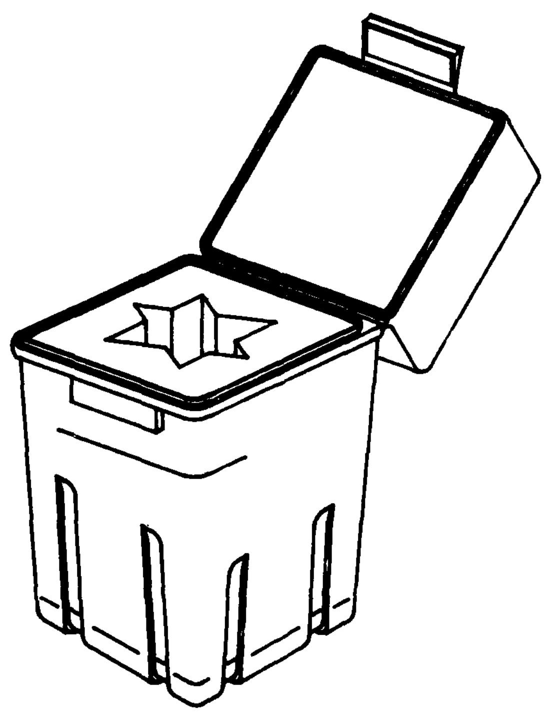
The Simulation Technique for Evaluating Containers (SIMTEC), a life cycle cost computer model, has been modified to allow the user to evaluate the effect of container maintenance on container life cycle cost. Two variables have been added to the CONDATA file. These are 'MMTBF' and 'MAINTENANCE'. 'MMTBF' is the number of one-way trips before the container requires maintenance. 'MAINTENANCE' is the dollar cost of performing each maintenance action on the container. The final product is a field labeled 'CONTAINER MAINTENANCE' which represents the overall container maintenance cost for the life cycle. This is added with 'CONTAINER COST', 'SHIPPING COST', and 'PACK/UNPACK COST' to appear as a total life cycle cost in the 'TOTAL COST OF THIS OPTION = ' field. The revised SIMTEC User Handbook is now available.

(Mr. John A. Armstrong, AFALD/PTPP, (513) 255-6901, AV 785-6901)

DEVELOPMENT OF NEW PLASTIC FAST PACK

A Statement of Work and specifications have been prepared to provide an improved plastic Fast Pack having increased utility, durability, and economy. Besides the six sizes presently under Type I (Star Pack) of the Federal Specification, PPP-B-1672, the twelve sizes under Type II (Slide Pack) will also be included. Cushioning material will remain the same except for electrostatic protection in Type II containers. The general concept of the new Fast Pack is that each container will be constructed of a single plastic material, with the possible exception of the gasket. Each container would be integral with top and bottom joined by a "living hinge" of the same plastic container material. The plastic Fast Pack will be a waterproof container, providing a seal against entry of free water. Appropriate tests have been included to determine whether plastic Fast Packs have a cost-effective life cycle. Solicitation for proposals is planned for 1983.

(Mr. Perry Quijas, AFALD/PTPD, (513) 257-3362, AV 787-3362)



EVALUATION OF NONMETALLIC OIL CANS

Metal containers for petroleum products are becoming increasingly scarce and expensive due to the lack of use in commercial markets. As a result of this situation, the Defense Logistics Agency requested that AFPEA evaluate commercially available nonmetallic oil cans for possible DOD use. Testing was conducted to simulate handling and global storage conditions. Testing consisted of free-fall drop tests and compression tests conducted at high (+140 degrees F), ambient, and low (-40 degrees F) temperatures. Composite fiber cans proved inadequate, and the high density polyethylene cans with metal lids performed only slightly better. High density polyethylene cans with an integral pouring spout demonstrated superior performance characteristics to the metal containers with one exception, stacking strength.

(Mr. Dwight Sheeter, AFALD/PTPT, (513) 257-4519, AV 787-4519)

DOD WORKING GROUP ON FOAM-IN-PLACE PACKAGING

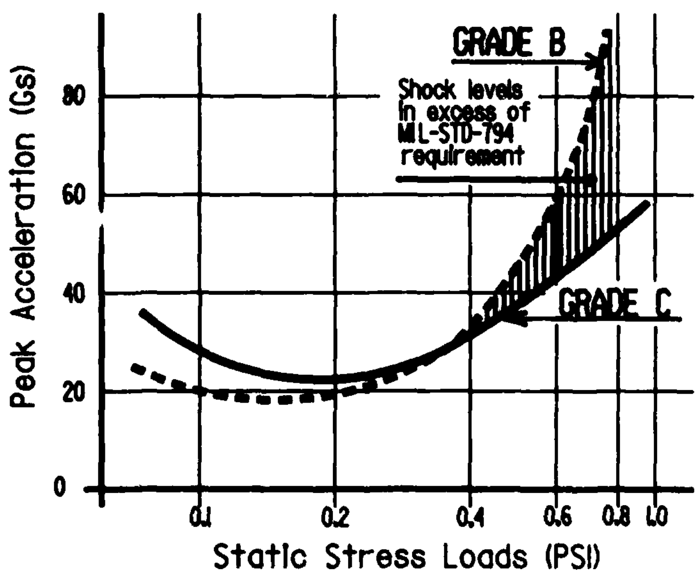
The Air Force Packaging Evaluation Agency is the lead service activity for foam-in-place (FIP) packaging. Since 1980, AFPEA has been directing efforts to reduce the number of FIP standardization documents. At that time, there were eleven documents including specifications, handbooks, and technical orders, many of which contained the same information. In a cooperative effort by Army, Navy, and Air Force personnel, the number has been reduced to three; a materials specification (Air Force), procedure specification (Army), and equipment specification (Navy). The three draft specifications should be submitted to applicable industry representatives and government organizations for prepublication review and comment by April 1983. Standardized DOD requirements will simplify procurement of materials and equipment, improve quality, lower equipment operating costs, and reduce the number of items to be carried in inventory.

(Mr. Avery Watson, AFALD/PTPT, (513) 257-4519, AV 787-4519)

INVESTIGATION OF CUSHIONING MATERIALS FOR FAST PACKS

Consideration of potential cost savings, as well as material availability problems, led to the initiation of a study to re-evaluate the polyurethane foam cushioning requirements specified in the Fast Pack specification (PPP-B-1672). Subsequently, the AFLC Spares Packaging Standardization Committee established and assigned an action item to AFPEA to determine whether the Grade C polyurethane foam currently specified for Fast Pack cushion inserts could be replaced with Grade B material which is less expensive and easier to obtain commercially. An extensive evaluation program was conducted on the Type I, III, and IV Fast Packs in which the dynamic cushioning performance of both Grade B and C polyurethane inserts were evaluated over the weight ranges currently specified in Appendix G of MIL-STD-794. Results indicated that Grade C cushioning material would accommodate a significantly larger range of items. Based on these findings and the fact that Grade C material has become commercially available at very little cost increase over Grade B material, it was concluded that the substitution of Grade B polyurethane for Grade C foam would not be justified.

(Mr. Alfred Sicard, AFALD/PTPT, (513) 257-7445, AV 787-7445)



ANTENNA SHIPPING CONTAINERS

Engineering support is being provided to Warner Robins Air Logistics Center for testing and modification of a family of antenna shipping containers. The containers are constructed of fiberglass reinforced plastic and contain a shock-isolated platform for carrying the antennas. A family of containers consisting of four different sizes is intended to replace fourteen different Technical Packaging Orders (TPOs) for shipping numerous antennas. The prototype containers have been delivered and initial tests identified areas for redesign. The modified containers are expected to be tested and evaluated during 1983.

(Mr. Rickey T. Adams, AFALD/PTPD, (513) 257-3362, AV 787-3362)

F-16 RADAR MULTIPAC MODIFICATION

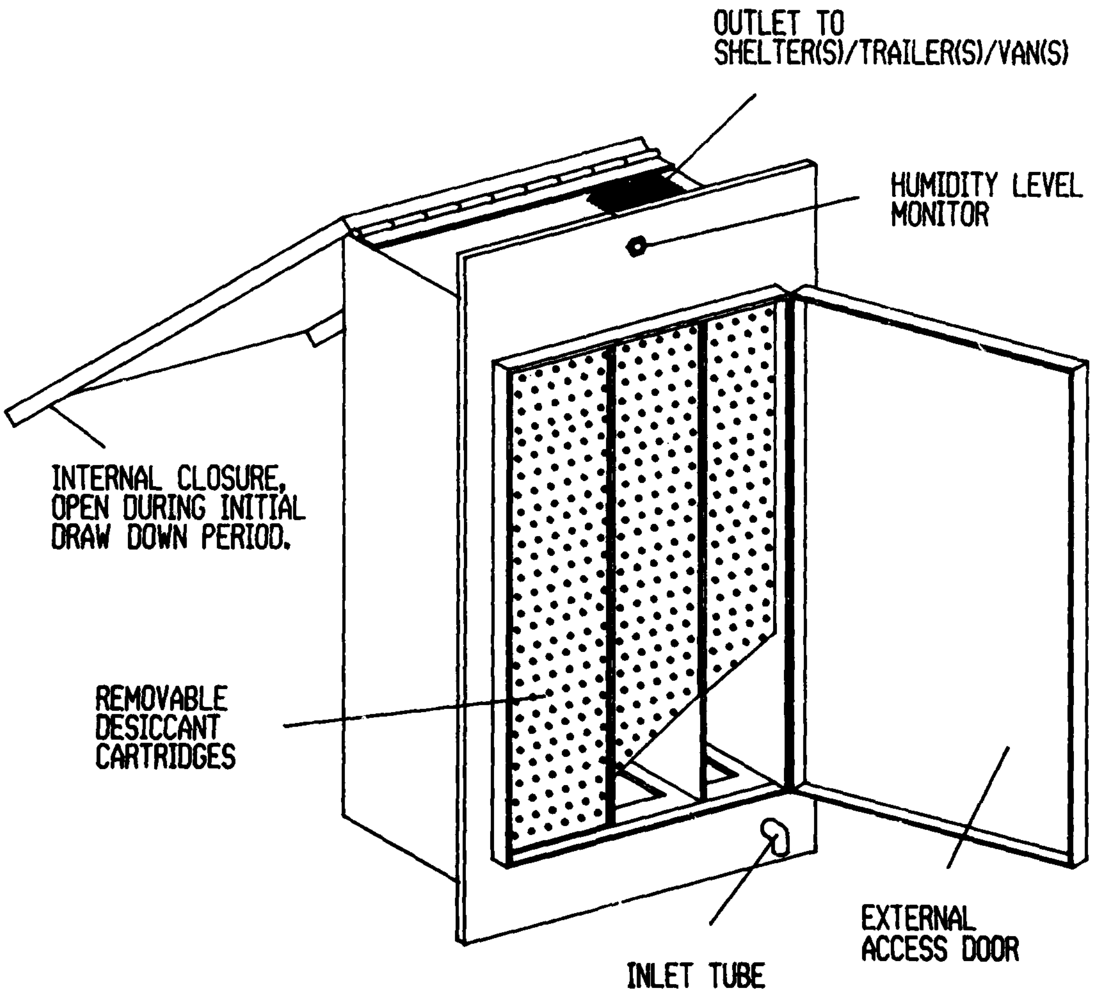
Currently F-16 AN/APG-66 Radar Line Replacement Units (LRUs) are packaged for shipment in government-furnished Multipac containers. The Multipac container is constructed of fiberglass reinforced plastic with a shock-isolated payload platform which is designed to accommodate numerous combinations of the five current LRUs. The shock-isolators are constructed of flexible steel cable and are designed to protect a payload of 100-280 pounds from input shock levels up to 15 G. The development of a number of improved LRUs, however, has generated the need for a modification to the Multipac container. Although the improved LRUs have different dimensions and weights than the current models, minor modifications to the LRU mounting/restraining system should permit the Multipac to be used for the shipment and storage of both the current LRU combinations and additional combinations of the improved LRUs. A contract for performing this modification is expected to be awarded in 1983.

(Ms. Doris Heidenreich, AFALD/PTPP, (513) 255-3226, AV 785-3226)

SHELTERIZED EQUIPMENT CORROSION PROTECTION

Free Breathing Static Dehumidification Units are being developed for protection of vans and shelters during storage and nonoperational periods. A contract was awarded to AGM Container Controls, Inc. for development and production of prototype units. These units will be installed in shelters at Sacramento Air Logistics Center for field service testing. Results of field testing are expected to be available in 1984.

(Mr. Edward J. Kowalski, AFALD/PTPD, (513) 257-3362, AV 787-3362)



F107 CRUISE MISSILE ENGINE CONTAINER

Oklahoma City Air Logistics Center validated the F107 Cruise Missile Engine (CME) container technical manual at Hardigg Industries, Inc. These containers have been in use in the field since October 1981. Current plans are to use the F107 CME container for shipment and storage of advanced cruise missile engines and medium range air-to-surface missile engines. New mounting brackets will be designed to accommodate these engines in the existing CME container shell.

(Capt Ron Ege, AFALD/PTPT, (513) 255-3226, AV 785-3226)

INVESTIGATION OF MIL-B-131 HEAT SEAL REQUIREMENTS

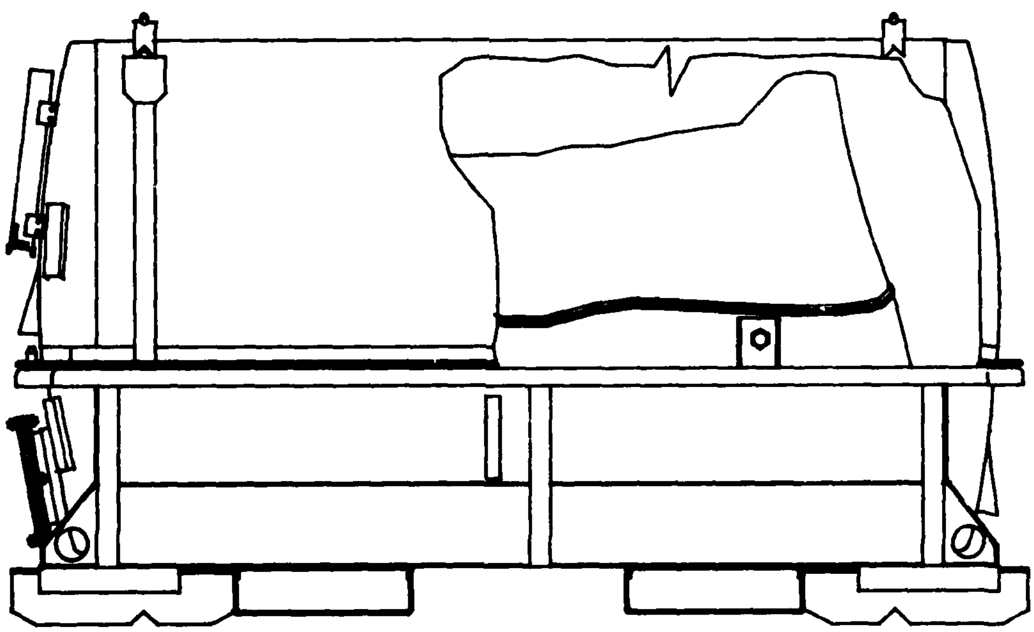
As a result of periodic deficiency reports from ALC Quality Assurance regarding the failure of flexible bags (MIL-B-131) to meet the seal strength requirements, this agency was tasked by HQ AFLC to investigate the problem. In the interim period, AFPEA authorized a waiver reducing the seal strength requirements from 50 ounces to 32 ounces. MIL-B-131 materials, representing several manufacturers, were obtained for evaluation. A production-type heat sealer was provided by Sacramento Air Logistics Center. Samples of the materials were provided to the Navy, the responsible activity for the MIL-B-131 barrier material specification and qualified products list. The Navy's tests indicated the materials met the qualification requirements. Our investigation also showed no problems under test conditions with the material, test procedure, or sealing equipment. Additional ultimate seal strength tests indicated that the 50-ounce requirement was significantly below the load that a properly made heat seal could actually sustain. An operational evaluation will be conducted to either validate specification requirements or identify the need for a change.

(Mr. Ted Smith, AFALD/PTPT, (513) 257-7445, AV 787-7445)

ENGINE CONTAINER MODIFICATION FIELD TESTS

Based on development and environmental test results (PTPD Report 81-2), plans have been initiated for field service testing of flexible engine containers (Bag-In-Box concept) for J-75-19W and J-85-GE-17 engines. The basic objective for the Bag-In-Box is to eliminate the high cost of refurbishment needed to maintain seals and pressure requirements for used engine containers. The field service tests will be conducted at Kelly AFB, TX and Tinker AFB, OK and are scheduled to conclude in calendar year 1984. A contract was awarded to Global Chemical Systems for fabrication of the flexible engine containers to be used for this testing.

(Mr. Edward J. Kowalski, AFALD/PTPD, (513) 257-3362, AV 787-3362)



NEW MAVERICK MISSILE CONTAINER

The need for a new container for the Maverick Missile was created by the development of the E and F versions of the missile which are significantly heavier than previous versions. In 1978, AFPEA conducted tests on the original metal container and the follow-on fiberglass container to determine if either one could be used to ship and store the AGM-65E missile. Both containers failed to protect the heavier missile from damage during the rough handling tests. AFPEA has worked closely with the Maverick Systems Program Office to develop a specification to be used for the procurement of a new container. The procurement package is expected to be released for proposals in FY83.

(Mr. Rickey T. Adams, AFALD/PTPD, (513) 257-3362, AV 787-3362)

F100 ENGINE CONTAINER CLOSURE SYSTEM IMPROVEMENT

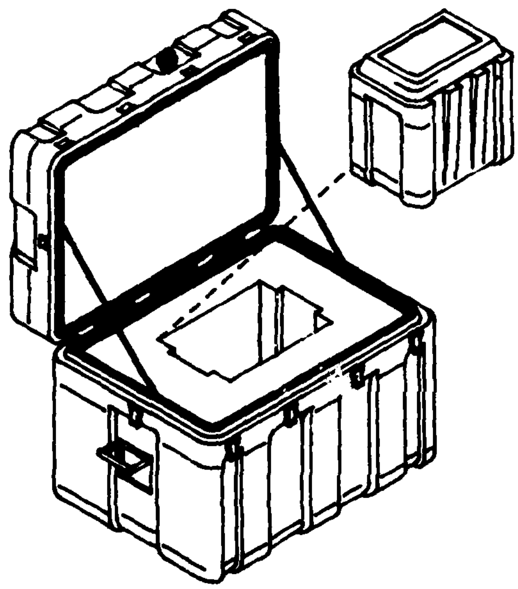
A contract modification was made in September 1982 with Plastics Research Corporation for the fabrication of a new closure/fastener system using the F100 Engine Core Module fiberglass reinforced plastic (FRP) container as the prototype unit for test and evaluation. The new closure system incorporates a bolt-like fastener which requires only a quarter to a half turn to operate, as opposed to the current fasteners (T-bolts) which must be torqued to a specified setting. The new closure system also incorporates a grooved flange for the container base shell into which a gasket of suitable cross-section is inserted. When the container is closed, the container cover flange contacts and compresses the gasket, thereby sealing the container until the cover and base flanges meet. The proposed closure system would require no special tools to operate, provide fast opening and closing, be corrosion resistant, prevent over-compression of the gasket, and eliminate the need to torque the fasteners. Test and evaluation of the prototype unit is scheduled to begin during the first quarter of 1983.

(Mr. Perry Quijas, AFALD/PTPD, (513) 257-3362, AV 787-3362)

M-X MISSILE GUIDANCE UNITS CONTAINER

The Ballistic Missile Office requested technical support to evaluate and develop a packaging system for the M-X missile Third Generation Gyro (TGG) units. Design requirements included low-level shock protection to 15G and long-term thermal stability during transit. Existing containers used for similar type items were evaluated for both shock attenuation and thermal insulation but were found to be inadequate. Several alternative concepts were identified and evaluated for suitability. The feasibility of using an inner thermal chest with a static heat retention system in an exterior cushioned container was chosen for the initial design effort. Three different liquid/jell formulations were evaluated for heat capacity and elevated temperature performance characteristics. Two different container systems, one reusable (100 plus trips) and one expendable, exceeded all design requirements. The cost effectiveness of each design will be evaluated and procurement initiated for the selected design. It is estimated that implementation of this system will result in a cost savings which will exceed $2,000,000.

(Mr. Walter Maurice, AFALD/PTPT, (513) 257-7445, AV 787-7445)



FIELD TEST OF IRREVERSIBLE HUMIDITY INDICATORS

The field test of a new relative humidity (RH) indicator was started in June 1982 and will continue until July 1983. The new indicator turns from white to orange or brown after exposure to RH which exceeds 55% for eight hours or more. Once the new indicator has changed color, it will not turn white again even if RH drops below 55%. This is unlike current RH indicators which turn pink if RH exceeds a specific value but return to blue when RH drops. A daytime inspection of the current indicators may reveal a safe RH level (indicator blue), whereas low nighttime temperatures could produce condensation (indicator pink) within the container. In November 1982, a midtest evaluation questionnaire was sent to Air Force, Army, Navy, and Marine Corp participants. Thirteen responses were received and twelve of these indicated a favorable impression of the new irreversible humidity indicator. The combined responses covered 140 test containers. The majority of the containers selected for testing were metal and contained missiles or avionics equipment. Forty-two of the 140 RH indicators changed color, thereby indicating that the containers were not properly sealed or the desiccant required replacement. Six of the thirteen responses identified a problem with gasket leaks. A report will be prepared after completion of field testing.

(Mr. Frank Jarvis, AFALD/PTPP, (513) 255-3226, AV 785-3226)

1982 ENGINEERING REPORTS

REPORT NO.	TITLE	PROJECT ENGINEER	AD NUMBER
PTPT 82-2	Vacuum Leak Test of Ziplock Bags	M. Horn	
PTPT 82-3	Evaluation of Material Handling Tote Boxes	D. Sheeter	
PTPT 82-4	Evaluation of High Performance Polyurethane Foam	M. Horn	
PTPT 82-5	Evaluation of Open-Cell Polyimide (Solimide TA-301) Foam	M. Horn	
PTPT 82-6	Accelerated Corrosion Study of Primers for Mark 82 Bombs	A. Watson	A118 220
PTPT 82-7	Development of a Specialized Pack for Shipping Water Specimens in Glass Bottles	A. Sicard	A120 514
PTPT 82-9	Evaluation of a Proposed Alternative Pack for the C/N ASN Gyroscope (TPO 00-303-6728)	M. Wyderski	
PTPT 82-10	Investigation of MIL-B-131 Barrier Material Heat Seals	T. Smith	A121 390
PTPT 82-11	Evaluation of Shipping Container for LN-12 IMU (TPO 987-6167)	M. Wyderski	
PTPT 82-12	Performance Evaluation of Metal vs Nonmetal One-Quart Oil Cans	D. Sheeter	
PTPT 82-13	Cost Effectiveness of Cushioning Materials for Fast Packs	A. Sicard	

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83